

(12) **United States Patent**  
**Mohr**

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(54) **MEDICAL DEVICE WITH ORIENTABLE TIP FOR ROBOTICALLY DIRECTED LASER CUTTING AND BIOMATERIAL APPLICATION**

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(58) **Field of Classification Search**

CPC combination set(s) only.  
See application file for complete search history.

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(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
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CPC ..... **A61B 18/24** (2013.01); **A61B 34/30**  
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(57) **ABSTRACT**

A medical device used in a medical robotic system has a conduit and an orientable tip. An optical fiber coupled to a laser source and/or a catheter coupled to one or more biomaterial sources extends through the conduit and tip so that the tip of the medical device may be robotically directed towards a target tissue for laser and/or biomaterial application as part of a medical procedure performed at a surgical site within a patient. A protective sheath covers the fiber as it extends through the conduit and tip. A first coupler adjustably secures at least the sheath to the medical device and a second coupler adjustably secures the fiber to at least the sheath. A similar dual coupler mechanism may be used to secure the sheathed catheter to the medical device.

**14 Claims, 9 Drawing Sheets**

